

Integrated Inflatable Ballute for Planetary Entry, Phase I

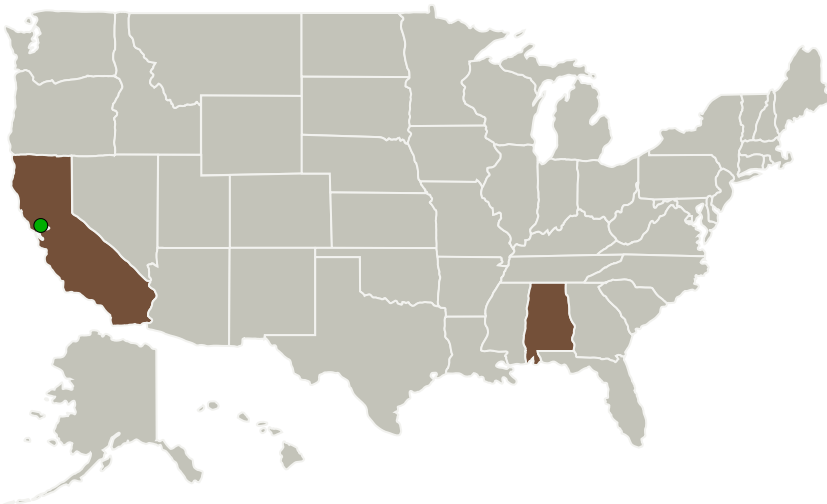
Completed Technology Project (2010 - 2010)



Project Introduction

CFDRC and TRLA are proposing to develop, design, and test a mass-optimized isotenoid inflatable structure that makes maximum utilization of materials in providing tailored stiffness and rigidity for hypersonic entry vehicles. The proposed inflatable structure is a hybrid isotenoid pressure restraint employing an impervious cloth-reinforced barrier structure enveloped by an integrated array of high-tenacity tendons. The segregation of material functions provides greater design flexibility to meet stiffness and thermal protection requirements, while the external grid of cordage tendons provides mass- and load pathway-optimized containment of the structure's global pressure loads. The focus of the Phase I effort is to develop and demonstrate the isotenoid inflatable structure, complete with thermal protection hardware and load bearing attachment fittings for guidance and control hardware. The tendon materials will be evaluated for their strength at high temperatures while cloth structural materials will be evaluated for their stiffness and thermal insulation properties to produce a truly multifunctional structural enclosure. Integrated fluid-structure-thermal simulations will be conducted with CFDRC's validated tools to provide insight into the aerodynamic, material stress and localized heating effects on the model and to verify/optimize the proposed design. Phase II activities will focus on fabricating and testing a prototype of the proposed inflatable structure to validate the design robustness and capability for larger payload masses. Pre and post testing multidisciplinary simulations will be conducted to verify and optimize the design. Additional simulations will be conducted for verification under exact flight conditions.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
CFD Research Corporation	Lead Organization	Industry	Huntsville, Alabama
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
Alabama	California

Project Transitions

**January 2010:** Project Start**July 2010:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/141122>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

CFD Research Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Essam Sheta

Co-Investigator:

Essam Sheta

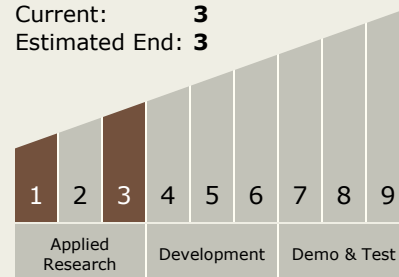
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Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
 - └ TX09.2 Descent
 - └ TX09.2.1 Aerodynamic Decelerators

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System